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SEQUENCE LISTING

<110> Korea Research Institute of Bioscience and Biotechnology
<120> Method for screening of a lipase having improved enzymatic activity using yeast surface display vector and the lipase
<130> 26666U
<140> 10/527,438
<141> 2005-03-11
<150> PCT/KR03/01820
<151> 2003-09-04
<150> KR 2002-55575
<151> 2002-09-13
<160> 19
<170> PatentIn version 3.5
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<213> Artificial Sequence
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<223> CALB primer 1
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<400> 2
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<223> CALB primer 3
<400> 3
gcggatccgg ggggtgacgat gccggag 27

<210> 4
<211> 19
<212> DNA
<213> Artificial Sequence

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<220>
 <223> GPD-err primer

 <400> 4
 gcagagctaa ccaataagg 19

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 <223> T-0 primer

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 <211> 1023
 <212> DNA
 <213> Candida antarctica

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 gtgcccacca ccaacctcta ctcggcgacc gacgagatcg ttcagcctca ggtgtccaac 660
 tcgccactcg actcatccta cctcttcaac gggaagaacg tccaggcaca ggctgtgtgt 720
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<212> DNA
<213> Candida antarctica

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<213> Candida antarctica

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ttcttcccca gtatcaggct caaggctgat cgacttatgg ctttgcgcc cgactacaag 480
ggcaccgtcc tcgccggccc tctcgatgca ctgcgggta gtgcaccctc cgtatggcag 540
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ggtcgatccg ccctgcgctc caccacgggc caggctcgta gtgcagacta tggcattacg	840
gactgcaacc ctcttcccgc caatgatctg actcccgagc aaaaggctcg cgcggctgcg	900
ctcctggcgc cggcggctgc agccatcgtg gcgggtccaa agcagaactg cgagcccgac	960
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ccc	1023

<210> 9
 <211> 319
 <212> PRT
 <213> Candida antarctica

<400> 9

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			20					25					30		

Pro	Ile	Leu	Leu	Val	Pro	Gly	Thr	Gly	Thr	Thr	Gly	Pro	Gln	Ser	Phe
		35					40					45			

Asp	Ser	Asn	Trp	Ile	Pro	Leu	Ser	Ala	Gln	Leu	Gly	Tyr	Thr	Pro	Cys
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Trp	Ile	Ser	Pro	Pro	Pro	Phe	Met	Leu	Asn	Asp	Thr	Gln	Val	Asn	Thr
65					70					75					80

Glu	Tyr	Met	Val	Asn	Ala	Ile	Thr	Thr	Leu	Tyr	Ala	Gly	Ser	Gly	Asn
				85					90					95	

Asn	Lys	Leu	Pro	Val	Leu	Thr	Trp	Ser	Gln	Gly	Gly	Leu	Val	Ala	Gln
			100					105					110		

Trp	Gly	Leu	Thr	Phe	Phe	Pro	Ser	Ile	Arg	Ser	Lys	Val	Asp	Arg	Leu
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Met	Ala	Phe	Ala	Pro	Asp	Tyr	Lys	Gly	Thr	Val	Leu	Ala	Gly	Pro	Leu
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Asp	Ala	Leu	Ala	Val	Ser	Ala	Pro	Ser	Val	Trp	Gln	Gln	Thr	Thr	Gly
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Ser Ala Leu Thr Thr Ala Leu Arg Asn Ala Gly Gly Leu Thr Gln Ile
165 170 175

Val Pro Thr Thr Asn Leu Tyr Ser Ala Thr Asp Glu Ile Val Gln Pro
180 185 190

Gln Val Ser Asn Ser Pro Leu Asp Ser Ser Tyr Leu Phe Asn Gly Lys
195 200 205

Asn Val Gln Ala Gln Ala Val Cys Gly Pro Leu Phe Val Ile Asp His
210 215 220

Ala Gly Ser Leu Thr Ser Gln Phe Ser Tyr Val Val Gly Arg Ser Ala
225 230 235 240

Leu Arg Ser Thr Thr Gly Gln Ala Arg Ser Ala Asp Tyr Gly Ile Thr
245 250 255

Asp Cys Asn Pro Leu Pro Ala Asn Asp Leu Thr Pro Glu Gln Lys Val
260 265 270

Ala Ala Ala Ala Leu Pro Ala Pro Ala Ala Ala Ala Ile Val Ala Gly
275 280 285

Pro Lys Gln Asn Cys Glu Pro Asp Leu Met Pro Tyr Ala Arg Pro Phe
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Ala Val Gly Lys Arg Thr Cys Ser Gly Ile Val Thr Pro Gly Ser
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<212> PRT
<213> Candida antarctica

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35 40 45

Asp Ser Asn Trp Ile Pro Leu Ser Ala Gln Leu Gly Tyr Thr Pro Cys
50 55 60

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Trp Ile Ser Pro Pro Pro Phe Met Leu Asn Asp Thr Gln Val Asn Thr
 65 70 75 80
 Glu Tyr Met Val Asn Ala Ile Thr Thr Leu Tyr Ala Gly Ser Gly Asn
 85 90 95
 Asn Lys Leu Pro Val Leu Thr Trp Ser Gln Gly Gly Leu Val Ala Gln
 100 105 110
 Trp Gly Leu Thr Phe Phe Pro Ser Ile Arg Ser Lys Val Asp Arg Leu
 115 120 125
 Met Ala Phe Ala Pro Asp Tyr Lys Gly Thr Val Leu Ala Gly Pro Leu
 130 135 140
 Asp Ala Leu Ala Val Ser Ala Pro Ser Val Trp Gln Gln Thr Thr Gly
 145 150 155 160
 Ser Ala Leu Thr Thr Ala Leu Arg Asn Ala Gly Gly Leu Thr Gln Ile
 165 170 175
 Val Pro Thr Thr Asn Leu Tyr Ser Ala Thr Asp Glu Ile Val Gln Pro
 180 185 190
 Gln Val Ser Asn Ser Pro Leu Asp Ser Ser Tyr Leu Phe Asn Gly Lys
 195 200 205
 Asn Val Gln Ala Gln Ala Val Cys Gly Pro Gln Phe Val Ile Asp His
 210 215 220
 Ala Gly Ser Leu Thr Ser Gln Phe Ser Tyr Val Val Gly Arg Ser Ala
 225 230 235 240
 Leu Arg Ser Thr Thr Gly Gln Ala Arg Ser Ala Asp Tyr Gly Ile Thr
 245 250 255
 Asp Cys Asn Pro Leu Pro Ala Asn Asp Leu Thr Pro Glu Gln Lys Val
 260 265 270
 Ala Ala Ala Ala Leu Pro Ala Pro Ala Ala Ala Ala Ile Val Ala Gly
 275 280 285
 Pro Lys Gln Asn Cys Glu Pro Asp Leu Met Pro Tyr Ala Arg Pro Phe
 290 295 300
 Ala Val Gly Lys Arg Thr Cys Ser Gly Ile Val Thr Pro Gly Ser

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<210> 11
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<212> PRT
<213> Candida antarctica

<400> 11

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Pro Ile Leu Leu Val Pro Gly Thr Gly Thr Thr Gly Pro Gln Ser Phe
35 40 45

Asp Ser Asn Trp Ile Pro Leu Ser Ala Gln Leu Gly Tyr Thr Pro Cys
50 55 60

Trp Ile Ser Pro Pro Phe Met Leu Asn Asp Thr Gln Val Asn Thr
65 70 75 80

Glu Tyr Met Val Asn Ala Ile Thr Thr Leu Tyr Ala Gly Ser Gly Asn
85 90 95

Asn Lys Leu Pro Val Leu Thr Trp Ser Gln Gly Gly Leu Val Ala Gln
100 105 110

Trp Gly Leu Thr Phe Phe Pro Ser Ile Arg Ser Lys Val Asp Arg Leu
115 120 125

Met Ala Phe Ala Pro Asp Tyr Lys Gly Thr Val Leu Ala Gly Pro Leu
130 135 140

Asp Ala Leu Ala Val Ser Ala Pro Ser Val Trp Gln Gln Thr Thr Gly
145 150 155 160

Ser Ala Leu Thr Thr Ala Leu Arg Asn Ala Gly Gly Leu Thr Gln Ile
165 170 175

Val Pro Thr Thr Asn Leu Tyr Ser Ala Thr Asp Glu Ile Val Gln Pro
180 185 190

Gln Val Ser Asn Ser Pro Leu Asp Ser Ser Tyr Leu Phe Asn Gly Lys
195 200 205

Asn Val Gln Ala Gln Ala Val Cys Gly Pro Gln Phe Val Ile Asp His
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220

210

215

Ala Gly Ser Leu Thr Ser Gln Phe Ser Tyr Val Val Gly Arg Ser Ala
225 230 235 240

Leu Arg Ser Thr Thr Gly Gln Ala Arg Ser Ala Asp Tyr Gly Ile Thr
245 250 255

Asp Cys Asn Pro Leu Pro Ala Asn Asp Leu Thr Pro Glu Gln Lys Val
260 265 270

Ala Ala Ala Ala Leu Leu Ala Pro Ala Ala Ala Ala Ile Val Ala Gly
275 280 285

Pro Lys Gln Asn Cys Glu Pro Asp Leu Met Pro Tyr Ala Arg Pro Phe
290 295 300

Ala Val Gly Lys Arg Thr Cys Ser Gly Ile Val Thr Pro
305 310 315

<210> 12
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<213> Artificial Sequence

<220>
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26

<210> 13
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<212> PRT
<213> Artificial Sequence

<220>
<223> a-amylase secretion signal

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<210> 14
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<212> PRT
<213> Candida antarctica

<400> 14

SEQ_LISTING_11302009

Leu Pro Ser Gly Ser Asp Pro Ala Phe Ser Gln Pro Lys Ser Val Leu
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 Asp Ala Gly Leu Thr Cys Gln Gly Ala Ser Pro Ser Ser Val Ser Lys
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 Pro Ile Leu Leu Val Pro Gly Thr Gly Thr Thr Gly Pro Gln Ser Phe
 35 40 45
 Asp Ser Asn Trp Ile Pro Leu Ser Ala Gln Leu Gly Tyr Thr Pro Cys
 50 55 60
 Trp Ile Ser Pro Pro Pro Phe Met Leu Asn Asp Thr Gln Val Asn Thr
 65 70 75 80
 Glu Tyr Met Val Asn Ala Ile Thr Thr Leu Tyr Ala Gly Ser Gly Asn
 85 90 95
 Asn Lys Leu Pro Val Leu Thr Trp Ser Gln Gly Gly Leu Val Ala Gln
 100 105 110
 Trp Gly Leu Thr Phe Phe Pro Ser Ile Arg Ser Lys Val Asp Arg Leu
 115 120 125
 Met Ala Phe Ala Pro Asp Tyr Lys Gly Thr Val Leu Ala Gly Pro Leu
 130 135 140
 Asp Ala Leu Ala Val Ser Ala Pro Ser Val Trp Gln Gln Thr Thr Gly
 145 150 155 160
 Ser Ala Leu Thr Thr Ala Leu Arg Asn Ala Gly Gly Leu Thr Gln Ile
 165 170 175
 Val Pro Thr Thr Asn Leu Tyr Ser Ala Thr Asp Glu Ile Val Gln Pro
 180 185 190
 Gln Val Ser Asn Ser Pro Leu Asp Ser Ser Tyr Leu Phe Asn Gly Lys
 195 200 205
 Asn Val Gln Ala Gln Ala Val Cys Gly Pro Leu Phe Val Ile Asp His
 210 215 220
 Ala Gly Ser Leu Thr Ser Gln Phe Ser Tyr Val Val Gly Arg Ser Ala
 225 230 235 240
 Leu Arg Ser Thr Thr Gly Gln Ala Arg Ser Ala Asp Tyr Gly Ile Thr
 245 250 255

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Asp Cys Asn Pro Leu Pro Ala Asn Asp Leu Thr Pro Glu Gln Lys Val
260 265 270

Ala Ala Ala Ala Leu Leu Ala Pro Ala Ala Ala Ala Ile Val Ala Gly
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Pro Lys Gln Asn Cys Glu Pro Asp Leu Met Pro Tyr Ala Arg Pro Phe
290 295 300

Ala Val Gly Lys Arg Thr Cys Ser Gly Ile Val Thr Pro
305 310 315

<210> 15
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<223> LQ53 primer

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<210> 16
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> LQ35 primer

<400> 16
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<210> 17
<211> 30
<212> DNA
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<223> LP53 primer

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<212> DNA
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<220>
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<210> 19
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 <212> PRT
 <213> Candida antarctica

<400> 19

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 20 25 30

Phe Ser Gln Pro Lys Ser Val Leu Asp Ala Gly Leu Thr Cys Gln Gly
 35 40 45

Ala Ser Pro Ser Ser Val Ser Lys Pro Ile Leu Leu Val Pro Gly Thr
 50 55 60

Gly Thr Thr Gly Pro Gln Ser Phe Asp Ser Asn Trp Ile Pro Leu Ser
 65 70 75 80

Ala Gln Leu Gly Tyr Thr Pro Cys Trp Ile Ser Pro Pro Pro Phe Met
 85 90 95

Leu Asn Asp Thr Gln Val Asn Thr Glu Tyr Met Val Asn Ala Ile Thr
 100 105 110

Thr Leu Tyr Ala Gly Ser Gly Asn Asn Lys Leu Pro Val Leu Thr Trp
 115 120 125

Ser Gln Gly Gly Leu Val Ala Gln Trp Gly Leu Thr Phe Phe Pro Ser
 130 135 140

Ile Arg Ser Lys Val Asp Arg Leu Met Ala Phe Ala Pro Asp Tyr Lys
 145 150 155 160

Gly Thr Val Leu Ala Gly Pro Leu Asp Ala Leu Ala Val Ser Ala Pro
 165 170 175

Ser Val Trp Gln Gln Thr Thr Gly Ser Ala Leu Thr Thr Ala Leu Arg
 180 185 190

Asn Ala Gly Gly Leu Thr Gln Ile Val Pro Thr Thr Asn Leu Tyr Ser
 195 200 205

Ala Thr Asp Glu Ile Val Gln Pro Gln Val Ser Asn Ser Pro Leu Asp
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210

215

220

Ser Ser Tyr Leu Phe Asn Gly Lys Asn Val Gln Ala Gln Ala Val Cys
 225 230 235 240

Gly Pro Leu Phe Val Ile Asp His Ala Gly Ser Leu Thr Ser Gln Phe
 245 250 255

Ser Tyr Val Val Gly Arg Ser Ala Leu Arg Ser Thr Thr Gly Gln Ala
 260 265 270

Arg Ser Ala Asp Tyr Gly Ile Thr Asp Cys Asn Pro Leu Pro Ala Asn
 275 280 285

Asp Leu Thr Pro Glu Gln Lys Val Ala Ala Ala Ala Leu Leu Ala Pro
 290 295 300

Ala Ala Ala Ala Ile Val Ala Gly Pro Lys Gln Asn Cys Glu Pro Asp
 305 310 315 320

Leu Met Pro Tyr Ala Arg Pro Phe Ala Val Gly Lys Arg Thr Cys Ser
 325 330 335

Gly Ile Val Thr Pro Gly Ser
 340